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ABSTRACT

A study was conducted to determine the optimum combination of selected social, academic, and demographic variables to maximally differentiate membership in the successful, unsuccessful, and withdrawal groups of first-year computer programming majors in Virginia community colleges. A questionnaire focusing on 18 selected variables was administered to 106 students at eight community colleges. Course grades permitted classification into the successful, unsuccessful, and withdrawal groups. The most discriminating variables, as evidenced by the standardized coefficient values, were (1) grade-point average; (2) student's perception of teacher's attitude toward students; (3) student's perception of teacher's fairness in grading; (4) type of employment; (5) student's stated reason for initial enrollment in programming curriculum; and (6) total yearly income in student's household. The demographic variables (sex, marital status, race, and age) did not appear to discriminate among the groups. A number of academic and social variables commonly thought to discriminate among successful and unsuccessful groups (e.g., level of college English competence and amount of employment) did not contribute to the separation of the three respondent groups. The study report contains recommendations to administrators of computer programming curricula. (Author/AYC)

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PREDICTING SUCCESS OF PROGRAMMING STUDENTS

by

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J. Sargeant Reynolds Community College
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INTRODUCTION

A major contribution of the community college to the maintenance of educational opportunity is its growing commitment to offer its services to all persons. Because of low cost, accessibility, and a variety of programs, educational authorities often use the term "open-door" to describe the admissions policy of these two-year educational institutions. As a result of this admissions policy, many nontraditional and uninformed students--often highly dropout prone--enter community college programs.

High attrition and academic failure among college undergraduate students are common problems of a complex nature. However, researchers report that community colleges generally have higher dropout rates than four-year colleges and universities [1]. Furthermore, some of these researchers, in an effort to provide more effective counseling services, have conducted studies to identify factors related to success in various subject areas [2] [3]. A recent study conducted in Virginia community colleges identified factors affecting the success of computer programming students [4].

THE VIRGINIA STUDY

Purpose and Methodology

The purpose of this study was to determine the optimum combination of selected social, academic, and demographic variables to

maximally differentiate membership in the successful, unsuccessful, and withdrawal groups of first-year computer programming majors in Virginia community colleges.

The survey instrument, a questionnaire focusing on 18 selected variables (See Table 1), was administered to 106 students. These students were enrolled in randomly selected sections of the following first-year courses at the eight Virginia community colleges offering the AAS degree in computer programming: (1) DAPR 106 - Principles of Data Processing; (2) DAPR 144 - Computer Concepts; and (3) DAPR 147 - Cobol Programming.

Course grades, obtained from college offices of admissions and records, permitted classification into the successful, unsuccessful, and withdrawal groups. Subsequently, the following processing options of discriminant analysis [5] [6] were computed:

1. standardized discriminant coefficient, representing the relative contribution of its associated variable to the calculated function;

2. group centroids, presenting the means on each function for a single group; and

3. classification, predicting likely group membership when the only information known is the case's values on the discriminating variables.

Findings of the Study

Table 2 ranks the 18 variables in order of discriminating power. The most discriminating variables, as evidenced by the

standardized coefficient values, were: (1) grade-point average, (2) student's perception of teacher's attitude toward students, (3) student's perception of teacher's fairness in grading, (4) type of employment, (5) student's stated reason for initial enrollment in programming curriculum, and (6) total yearly income in student's household.

The classification of cases showed that there was not a wide disparity among the prediction probabilities of the successful, unsuccessful, and withdrawal groups of the sample studied.

Reasons listed for withdrawing from classes included poor grades, nonattendance, non-motivation, and full-time employment.

Conclusions

Based on the findings established in the survey, the following conclusions were drawn:

1. Selected independent variables can be used to predict membership in the successful, unsuccessful, and withdrawal groups in the first-year computer programming students.

2. Success in the first year of the programming curriculum may be associated with variables of an academic and social nature--variables which fall under the categories of student attitudes, motivation, general learning skills, and financial ability.

3. The demographic variables (sex, marital status, race and age) did not appear to discriminate among the successful, unsuccessful, and withdrawal groups of programming students.

4. A number of academic and social variables commonly thought to discriminate among successful, unsuccessful, and withdrawal groups

of college students (e.g., level of college English competence and amount of employment--part-time or full-time) did not contribute to the separation of the three respondent groups in the sample studied.

THE GENERALIZATIONS

Although originally addressed to administrators of the computer programming curriculum in Virginia community colleges as an outgrowth of the research findings, the following recommendations, implications, and suggestions for future study may be helpful to educators elsewhere:

Recommendations

1. Because student perceptions of teacher attitudes and fairness in grading may affect academic success in first-year courses, administrators should consider the assignment of "student-oriented" teachers, those who more readily develop positive attitudes and rapport, to these courses.

2. Since the type of employment may affect the success of programming students in first-year courses, faculty and administrators should explore the possibility of securing part-time data processing jobs for these students.

3. Inasmuch as the student's initial, primary reason for enrolling in the computer programming curriculum may be a prediction of success in the first year, counselors should determine this motivational factor and advise the student accordingly.

Implications

1. Because a large number of students leave the programming

curriculum before the second year, first-year courses should provide some entry-level data processing skills.

2. Inasmuch as first-year computer programming classes may consist of both internally and externally motivated students and students with learning abilities at various levels, teachers should be flexible when selecting teaching strategies; due consideration should be given to individualized and competency-based instruction.

Suggestions for Future Study

1. The sample was limited to daytime first-year computer programming students in Virginia community colleges; therefore, future studies should examine characteristics of evening students and of second-year students.

2. One subject area in one type of Virginia educational institution was studied. However, high attrition and academic failure are common to many disciplines. Therefore, educators should support similar research in (a) other Virginia community college programs, (b) community college programs in other geographic areas, and/or (c) programs in other two-year institutions and four-year colleges.

3. The research design used in this study (ex post facto) has an inherent weakness: lack of control of independent variables. With experimental research, however, there is this control. Accordingly, experimental research, concentrating on the six most discriminating variables of the present study, should be conducted. The subjects of this experimental study should be (a) selected on the basis of these six variables, and (b) studied longitudinally.

Table 1

DESCRIPTION OF THE 18 INDEPENDENT VARIABLES

Abbreviation	Description
1. AGE	age
2. SEX	sex
3. RACE	race
4. MARITAL	marital status
5. FINDN	student's individual yearly income
6. FINHH	total yearly income in student's household
7. EMPA	amount of employment (e.g., part-time or full-time)
8. EMPT	type of employment (computer related or otherwise)
9. HS	graduation from high school, GED, or neither
10. ENG	level of college English competence determined by nature of last completed course
11. MATH	level of college math competence determined by nature of last completed course
12. GPA	overall grade-point average for quarter when survey was conducted
13. REASON	student's stated reason for initial enrollment in computer programming curriculum
14. EVALA	student's perception of teacher's presentation of subject matter
15. EVALB	student's perception of teacher's knowledge of subject matter
16. EVALC	student's perception of teacher's attitude toward students
17. EVALD	student's perception of teacher's fairness in grading
18. PREVG	student's grade in previous first-year data processing course(s) (available for DAPR 144 and DAPR 147 respondents only)

Table 2

RELATIVE CONTRIBUTION OF VARIABLES TO FUNCTION 1
USING STANDARDIZED COEFFICIENTS

(1)	0.63364	GPA	overall grade-point average for quarter when survey was conducted
(2)	0.42333	EVALC	student's perception of teacher's attitude toward students
(3)	0.40567	EVALD	student's perception of teacher's fairness in grading
(4)	0.30047	EMPT	type of employment (computer related or otherwise)
(5)	0.24985	REASON	student's stated reason for initial enrollment in programming curriculum
(6)	-0.24563	FINHH	total yearly income in student's household
(7)	0.13388	SEX	sex
(8)	0.13308	MATH	level of college math competence determined by nature of last completed course
(9)	-0.11417	EVALB	student's perception of teacher's knowledge of subject matter
(10)	0.08796	MARITAL	marital status
(11)	0.08277	FININ	student's individual yearly income
(12)	-0,06218	RACE	race
(13)	0.05991	HS	graduation from school, GED, or neither
(14)	-0.05776	AGE	age
(15)	-0.05763	EMPA	amount of employment (e.g., part-time or full-time)
(16)	0.03402	ENG	level of college English competence determined by nature of last completed course
(17)	0.02894	PREVG	student's grade in previous first-year data processing course(s)
(18)	-0.01418	EVALA	student's perception of teacher's presentation of subject matter

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